

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (previously amended): An apparatus for detecting and responding to a surge event in a locomotive engine system including a turbocharger and a diesel engine, the apparatus comprising:

a sensor detecting an operating parameter of the turbocharger or the engine and generating a sensor signal indicative of the detected operating parameter; and

an engine control system responsive to the sensor signal for controlling a plurality of operational controls including a speed of the diesel engine, wherein the engine control system modifies one or more operational controls including the speed of the diesel engine when the sensor signal indicates a surge event.

Claim 2 (canceled).

Claim 3 (previously amended): An apparatus for detecting and responding to a surge event in a locomotive engine system including a turbocharger and a diesel engine, the apparatus comprising:

a sensor detecting an operating parameter of the turbocharger or the engine and generating a sensor signal indicative of the detected operating parameter; and

an engine control system responsive to the sensor signal for controlling a plurality of operational controls including a fuel injection advance angle of the diesel engine system, wherein the engine control system modifies the advance angle of the fuel injection system when the sensor signal indicates a surge event.

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Claim 4 (previously amended): An apparatus for detecting and responding to a surge event in a locomotive engine system including a turbocharger and a diesel engine, the apparatus comprising:

a sensor detecting an operating parameter of the turbocharger or the engine and generating a sensor signal indicative of the detected operating parameter; and

an engine control system responsive to the sensor signal for controlling a plurality of operational controls of the diesel engine including a horsepower rating of an electrical transmission system, and wherein the engine control system modifies a load on the diesel engine system when the sensor signal indicates a surge event.

Claim 5 (previously amended): The apparatus of claim 4, wherein the electrical transmission comprises:

a generator generating a Direct Current (DC) power signal; and

a DC traction motor coupled to an axle wheel set of the locomotive and responsive to the (DC) power signal for rotating the axle wheel set of the locomotive.

Claim 6 (previously amended): The apparatus of claim 4, wherein the electrical transmission comprises:

a generator generating a DC power signal;

an inverter for receiving the DC power signal and inverting the received DC power signal into an AC power signal

an AC traction motor coupled to an axle wheel set of the locomotive and responsive to the AC power signal for rotating the axle wheel set of the locomotive.

Claim 7 (original): An apparatus for detecting operating parameters indicative of a surge event in a turbocharger of a locomotive engine system including a diesel engine and the turbocharger and controlling the operation of the engine system to reduce turbocharger surge, the apparatus comprising:

a sensor detecting an operating parameter of engine system indicative of a surge event and generating a sensor signal indicative of the detected operating parameter; and

an engine control system responsive to the sensor signal for controlling a speed of operation of the diesel engine;

wherein when the engine system experiences a surge event, the engine control system increases the speed of the diesel engine to reduce turbocharger surge.

Claim 8 (original): The apparatus of claim 7, wherein the engine control system is responsive to the sensor signal to increase the speed of the diesel engine when the sensor signal indicates two surge events within a defined period of time.

Claim 9 (original): The apparatus of claim 7, wherein the diesel engine operates at a plurality of discrete operating speeds and the engine control system is responsive to the sensor signal and increases the speed of the diesel engine from a first discrete speed at which the diesel engine is operating to a higher discrete speed when a change in the sensor signal over time indicates a surge event.

Claim 10 (original): The apparatus of claim 7, wherein the engine control system increases the speed of the diesel engine an operating speed at which the diesel engine is operating to a higher speed for a predetermined period of time and thereafter decreases the speed of the diesel engine to the operating speed.

Claim 11 (original): The apparatus of claim 10, wherein the predetermined period of time is one-hour.

Claim 12 (original): The apparatus of claim 10, wherein the engine control system monitors surge events within the predetermined period of time and logs a report or generates a signal when a surge event occurs within the predetermined period of time.

Claim 13 (original): The apparatus of claim 7, wherein said throttle has discrete operating positions 1 to 8 and wherein the engine control system increases the engine speed when the sensor signal indicates a surge event and when the throttle is located in one of notch positions 5, 6 or 7.

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Claim 14 (original): The apparatus of claim 7, wherein the sensor is a manifold air pressure (MAP) transducer associated with an intake manifold of the diesel engine and the sensor signal is a MAP signal representing the air pressure within the intake manifold of the diesel engine, and wherein the engine control system increases the speed of the diesel engine when the MAP signal indicates a decrease in the air pressure of equal to or greater than a predefined amount of pressure within the defined period of time.

Claim 15 (original): The apparatus of claim 7, wherein the sensor is a turbocharger speed sensor that detects a rotational speed of the turbocharger and the sensor signal represents the rotational speed of the turbocharger and wherein the engine control system increases the speed of the diesel engine when the sensor signal indicates an increase in the turbocharger speed within a specified period of time.

Claim 16 (original): The apparatus of claim 7, wherein the sensor is a pressure transducer associated with an air intake system of the turbocharger and the sensor signal represents an air pressure at the air intake system of the turbocharger, and wherein the engine control system increases the speed of the diesel engine when the sensor signal indicates an increase or decrease in the air pressure over time.

Claim 17 (previously amended): The apparatus of claim 7, wherein the sensor is a strain gauge or an accelerometer associated with a surface of an air intake system of the turbocharger and the sensor signal represents a vibration or a deflection, respectively, of the surface of the air intake system, and wherein the control system increases the speed of the diesel engine when the sensor signal indicates an increase in the vibration within a preset period of time indicative of a surge event or indicates a deflection greater than a predetermined amount indicative of a surge event.

Claim 18 (original): An apparatus comprising:
a locomotive driven by a locomotive engine system having a turbocharger and a diesel engine, the engine operable at a plurality of discrete speeds;

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a sensor detecting an operating parameter of the turbocharger and/or the engine and generating a sensor signal representing the detected operating parameter; and

an engine control system for controlling the speed of the diesel engine at a discrete speed, each of which corresponds to a notch position of a throttle;

wherein the engine control system is responsive to the sensor signal and increases the speed of the diesel engine from a first discrete speed at which the diesel engine is operating to a higher discrete speed when a change in the sensor signal over time indicates a surge event of the turbocharger.

Claim 19 (original): The apparatus of claim 18, wherein the engine control system increases the speed of the diesel engine when the sensor signal indicates two surge events within a defined period of time.

Claim 20 (original): The apparatus of claim 18, wherein the diesel engine drives an electrical transmission comprising:

a generator generating a Direct Current (DC) power signal; and

a DC traction motor coupled to an axle wheel set of the locomotive and responsive to the (DC) power signal for rotating the axle wheel set of the locomotive.

Claim 21 (original): The apparatus of claim 18, wherein the diesel engine drives an electrical transmission comprising:

a generator generating a DC power signal;

an inverter for receiving the DC power signal and inverting the received DC power signal into an AC power signal

an AC traction motor coupled to an axle wheel set of the locomotive and responsive to the AC power signal for rotating the axle wheel set of the locomotive.

Claim 22 (original): An apparatus for detecting and responding to a surge event in a turbocharger of a locomotive driven by a diesel engine, the apparatus comprising:

a sensor detecting an operating parameter of the turbocharger or the engine and generating a sensor signal representing the detected operating parameter; and

an engine control system for controlling a speed of the diesel engine corresponding to a position of a throttle;

wherein the engine control system is responsive to the sensor signal and increases the speed of the diesel engine when the sensor signal indicates two surge events within a defined period of time.

Claim 23 (original): A locomotive propulsion system comprising a variable-speed diesel engine system having a combustion air intake manifold and an exhaust manifold, a fuel controller for supplying diesel fuel to the engine cylinders, a turbocharger connected to both of the exhaust and intake manifolds of the engine and having a turbine that is driven by the engine exhaust gases and that in turn drives a compressor for supplying pressurized air to the intake manifold, an engine speed sensor for sensing the speed of the engine, an electric power transmission system mechanically driven by the engine, and an excitation controller for controlling the power output of the transmission system; further comprising:

a sensor equipped to sense an operating parameter of the turbocharger or the engine and equipped to generate a sensor signal representing the sensed operating parameter; and

a controller adapted to receive the generated sensor signal for increasing the engine speed from a first discrete speed to another discrete speed for a predetermined period of time when a change in the sensor signal over time indicates a surge event.

Claim 24 (original): The system of claim 23, wherein the operating parameter includes one or more of the parameters: manifold air pressure (MAP), manifold air temperature (MAT), fuel value, turbocharger speed, vibration parameter, deflection parameter, engine horsepower, wheel slip and mass air flow at the air intake manifold.

Claim 25 (previously amended): A method for detecting and controlling a surge event of a locomotive engine system including a turbocharger and a diesel engine operable at a plurality of discrete speeds, the method comprising:

sensing an operating parameter of the engine system;

determining a change in the sensed operating parameter indicative of a surge event; and

controlling a speed of the diesel engine in response to the determined change.

Claim 26 (canceled):

Claim 27 (currently amended): The method of ~~claim 26~~ claim 25, wherein increasing the speed of the engine comprises increasing the speed of the diesel engine from a first discrete speed to a second discrete speed for a predetermined period of time.

Claim 28 (currently amended): The method of ~~claim 26~~ claim 25, further comprising monitoring surge events after increasing the speed of the engine and logging a report or generating a signal indicative of a surge event when a surge event occurs within the predetermined period of time.

Claim 29 (currently amended): The method of ~~claim 26~~ claim 25, wherein controlling the speed of the engine is increasing the engine speed to the higher discrete speed for a predetermined period of time and thereafter decreasing the speed of the diesel engine to the first speed.

Claim 30 (previously amended): A method for detecting and controlling a surge event of a locomotive engine system including a turbocharger and a diesel engine operable at a plurality of discrete speeds, the method comprising:

sensing an operating parameter of the engine system;

determining a change in the sensed operating parameter indicative of a surge event; wherein determining the occurrence of a surge event includes determining the occurrence of three surge events within a defined period of time; and

controlling an operational control of the engine system in response to the determined change.

Claim 31 (original): The method of claim 25, wherein sensing the operating parameter is sensing one or more of the parameters: manifold air pressure (MAP), manifold air temperature (MAT), fuel value, turbocharger speed, vibration parameter, deflection parameter, engine horsepower, wheel slip and mass air flow at the air intake manifold.

Claim 32 (previously amended): A method for detecting and controlling a surge event of a locomotive engine system including a turbocharger and a diesel engine operable at a plurality of discrete speeds, the method comprising:

- sensing an operating parameter of the engine system;
- determining a change in the sensed operating parameter indicative of a surge event; and
- controlling an fuel injection advance angle of the engine system in response to the determined change.

Claim 33 (previously amended): A method for detecting and controlling a surge event of a locomotive engine system including a turbocharger and a diesel engine operable at a plurality of discrete speeds, the method comprising:

- sensing an operating parameter of the engine system;
- determining a change in the sensed operating parameter indicative of a surge event; and
- controlling a horsepower load on the engine in response to the determined change.

Claim 34 (original): A method for detecting and controlling a surge event of a diesel engine in a locomotive engine system including a turbocharger and a diesel engine operable at a plurality of discrete speeds of operation, the method comprising:

- sensing an operating parameter of the engine system;
- determining the occurrence of a surge event in the turbocharger wherein a change in the sensed operating parameter over time is indicative of a surge event;
- controlling the speed of operation of the diesel engine to increase the speed of the engine from a first discrete speed to a second discrete speed for a predetermined period of

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time when the occurrence of a surge event is determined and thereafter decreasing the speed of the diesel engine to the first speed;

monitoring for a further surge event after increasing the speed of the engine and within a predetermined period of time; and

generating a signal indicative of a surge event when a further surge event occurs during the predetermined period of time.

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